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Predictors of uptake of influenza vaccination

A survey of pregnant women in Western Australia

Background

Pregnant women are at increased risk of complications following influenza infection. Vaccination is the most effective preventive strategy. This survey aimed to determine the levels of uptake of influenza vaccine in pregnant women in Western Australia (WA), the proportion of women offered vaccination as part of antenatal care, and women's attitudes toward influenza vaccination in pregnancy.

Methods

Computer assisted telephone interviews were conducted with 416 randomly selected women who were pregnant during the 2012 influenza vaccination season.

Results

Influenza vaccination coverage was 23%. Predictors of vaccination included believing that vaccination is safe for the infant, having been recommended vaccination by an antenatal care provider, and attending a general practitioner for most antenatal care. The majority (74%) of unvaccinated women reported that they would have the vaccine if their antenatal care provider recommended it.

Discussion

General practitioners lead the way in antenatal influenza vaccination in WA. Vaccination coverage can be improved if recommending and offering influenza vaccination becomes a routine part of antenatal care.

Keywords

influenza, human; immunisation; pregnancy

Pregnant women are at increased risk of serious illness following influenza infection. Vaccination is considered the most effective preventive strategy and is recommended as a routine part of antenatal care in any trimester.¹ The safety of antenatal influenza vaccination is well established, with no reports of serious adverse consequences of inactivated influenza vaccine in pregnant women or their children.^{2,3} Despite this, the most commonly reported reason for pregnant women not to have the vaccine is concern about its safety.⁴⁻⁶

In Australia, influenza vaccine has been supplied free-of-charge for pregnant women through the National Immunisation Program since 2010, and in November 2011, the Royal Australian and New Zealand College of Obstetricians and Gynaecologists strongly endorsed routine vaccination of all pregnant women against influenza.⁷ In March 2012, midwives and nurses were authorised to administer influenza vaccine to pregnant women in all Western Australian (WA) public metropolitan and regional facilities where women attend for antenatal care.⁸

In the United States (US), antenatal influenza vaccination during influenza season has been recommended by the American College of Obstetricians and Gynecologists since 2004. Despite this long standing recommendation, estimates of influenza vaccination coverage among pregnant women in the US have been consistently low, approximately 15%, until 2009 when uptake increased to nearly 50% in response to the influenza A (H1N1) pandemic.⁹ Antenatal influenza vaccination coverage rates vary

greatly between American states, ranging from 26.1% to 67.9%.^{9,10}

This survey aimed to determine for WA: the proportion of pregnant women offered influenza vaccination as part of antenatal care, uptake of seasonal influenza vaccination among women, women's knowledge of and attitudes toward influenza vaccination in pregnancy, and barriers or enablers to influenza vaccination in pregnancy.

Methods

Study design and study population

The study was a retrospective prevalence survey. A total of 16 460 women gave birth to a live infant in WA between 8 April 2012 and 7 October 2012 (as notified to the Midwives Notification System, a statutory database) and were therefore eligible for inclusion, having been pregnant during the 2012 influenza vaccination season.

A stratified, random sample of 570 women (285 new mothers residing in the Perth metropolitan area and 285 residing in rural or remote areas) were selected from the eligible population and sent a patient information sheet inviting them to participate in the survey. The expected response rate of 70% was calculated to yield a minimum final sample size of 400, giving a maximum relative standard error of $\pm 4.9\%$ at the standard 95% confidence interval for the total cohort. Willingness to participate was assumed unless the women actively opted out of the survey by telephone or email.

Data collection

The survey instrument was based on relevant questions from the Pregnancy Risk Assessment Monitoring System, a validated survey used extensively in the US, and a recent Melbourne study of influenza vaccination in pregnant

women.^{11,12} Data were collected in November 2012 by the Edith Cowan University Survey Research Centre using computer assisted telephone interviews. Women were asked about influenza vaccination status during their most recent pregnancy, knowledge of and attitudes toward influenza vaccination in pregnancy, whether or not influenza vaccine was offered/recommended by the antenatal care provider, and demographic information.

Vaccination status was verified by the woman referring to her records and stating date of vaccination, brand and batch number of vaccine, or by examining healthcare providers' records.

Data analysis

Data were analysed using SAS Enterprise Guide 5.1.¹³ Data were standardised to the age distribution of the overall WA population who gave birth between 8 April 2012 and 7 October 2012 to obtain weighted population prevalence estimates of influenza vaccination uptake. Univariate logistic regression models were fitted with influenza vaccination uptake as the dependent variable. Variables significant at $p > 0.1$ level were included in a multivariate regression model that was constructed to examine the association between having the influenza vaccine while pregnant, and knowledge and attitudes toward vaccination during pregnancy, after controlling for the remaining explanatory variables. The variable 'education' was removed from the final model because it introduced significant collinearity into the model when used in conjunction with the variable 'location where the respondent had the majority of their antenatal care'.

Results

Four out of 570 women opted out of the study and were not contacted further. An additional 67 women were excluded from data collection for reasons such as telephone not connected ($n=46$), incorrect contact details ($n=11$), infant deceased ($n=3$) or other reasons ($n=7$). A total of 416 women; 212 from the metropolitan area and 204 from country areas, completed computer assisted telephone interviews in November 2012, giving a raw response rate of 73% (416/566) and a participation rate (completed interviews/contactable and eligible for the study) of 94.5%.

Nine women were unsure if they had the influenza vaccination during their pregnancy and were therefore excluded from analyses.

Socio-demographic characteristics of the study cohort are shown in *Table 1*.

Vaccination coverage

One-quarter (25%; $n=104$) of the women surveyed reported receiving an influenza vaccine during their most recent pregnancy, and 23% were verified as vaccinated ($n=94$).

Compliance with the WA Department of Health operational directive

Only 36% of women had been recommended influenza vaccination by their antenatal care provider and only 25% were offered influenza vaccine during antenatal care.

Knowledge and beliefs about influenza vaccination

When asked about the effect of influenza vaccination during pregnancy, 23% of women reported a belief that it was not safe, and 30% that it would not protect against influenza. When asked about the effect on the baby, 27% reported a belief that vaccination was not safe, and 26% believed that it did not offer protection.

Univariate analysis shows that women were more likely to get vaccinated if they:

- had a chronic condition
- had most of their antenatal care outside a public hospital
- believed that influenza vaccination in pregnancy was safe and protective for their infant and themselves
- were recommended influenza vaccination by their care provider
- were offered vaccination at their antenatal care facility
- were aware of government funded influenza vaccines (*Table 1*).

Factors associated with being vaccinated against influenza

Seventy-four percent of unvaccinated women reported that they would have seasonal influenza vaccine if their antenatal care provider recommended it.

Table 2 shows factors associated with influenza vaccination after adjusting for the possible

confounders such as age and geographic location. Women were more likely to get vaccinated if they:

- believed that the influenza vaccine was safe for the unborn infant
- were advised to get the vaccine by an antenatal care provider
- received majority of antenatal care from a GP or obstetrician
- believed vaccination would protect the infant against influenza after birth
- had a chronic condition
- were offered influenza vaccination in an antenatal care setting.

These factors explained over 70% of the total variation in vaccination uptake.

Discussion

In 2012, the World Health Organization Strategic Advisory Group of Experts on Immunization recommended 'pregnant women as the most important risk group for seasonal influenza vaccination' because of all the risk groups, pregnant women are the most likely to benefit from being vaccinated.¹⁴ However, less than one-quarter (23%) of pregnant women in WA were vaccinated against influenza in 2012 – a much lower uptake than that achieved in the elderly (68%) and adults with chronic conditions (31%).¹⁵ Similar coverage rates of 25%¹⁶ and 27%¹⁷ were reported in New South Wales in 2012 and 2011, respectively.¹⁶ In comparison, during the 2009 influenza pandemic – despite an influenza season in which hospitalisations and deaths of pregnant women due to influenza were prominent in both the media and scientific communications,¹⁸ vaccination coverage in pregnant women in WA was estimated to be 6.9% in one hospital¹⁹ and 10.3% statewide.²⁰ Although antenatal influenza vaccination uptake more than doubled between 2009 and 2012 in WA, it has a long way to go in reaching optimal influenza vaccine coverage in this at risk group.

How to improve influenza vaccination coverage in pregnant women

Strategies implemented to improve influenza vaccination uptake in pregnant women elsewhere in Australia and in other countries, include the use of text messages to remind women to get vaccinated,²¹ distribution of educational materials, implementation of standing orders to allow opportunistic vaccination⁵ and antenatal care

provider recommendation of the vaccine. These methods have had varying success. One recent randomised controlled trial from the US found that text messages were ineffective.²¹ In contrast,

uptake of antenatal seasonal influenza vaccine in a Melbourne hospital increased from 30% in 2010 to 40% in 2011 after implementation of an educational program for maternity staff and

pregnant women.¹² These findings are consistent with Canadian studies showing that influenza vaccination rates increased from 19% in 2006 to 56% in 2007 following provision of an information

Table 1. Univariate logistic regression results for control variables, with the likelihood of having the influenza vaccination as the dependent variable

Characteristic	No. of women	Percent vaccinated	OR	95% CI
Women who were pregnant during the Australian flu season	407			
Age (years)				
18–29	198	25.8		
>30	209	25.4	1.02	(0.65–1.59)
Location				
Country	201	25.9		
Metropolitan	206	25.2	0.97	(0.62–1.51)
Highest level of education completed				
Primary/high school	129	24.0		
TAFE	114	23.7	0.98	(0.54–1.77)
University undergraduate	90	23.3	0.96	(0.51–1.81)
University postgraduate	70	35.7	1.76	(0.93–3.31)
Socioeconomic status				
Quintile 5 (least disadvantaged)	51	31.4		
Quintile 4	110	22.7	0.64	(0.31–1.35)
Quintile 3	160	21.3	0.59	(0.29–1.19)
Quintile 2	45	28.9	0.89	(0.37–2.13)
Quintile 1 (most disadvantaged)	38	42.1	1.59	(0.66–3.81)
Chronic conditions				
No	350	22.9		
Yes	57	42.1	2.46*	(1.37–4.39)
Antenatal care provider				
Public hospital	138	15.2		
GP	129	32.6	2.69†	(1.49–4.87)
Private obstetrician	127	30.7	2.47*	(1.36–4.49)
Other	5	40.0	3.71	(0.59–23.59)
Believing flu vaccination is safe for infant = No	108	1.9		
Believing flu vaccination is safe for infant = Yes	199	46.7	46.49†	(11.17–193.52)
Believing flu vaccination is safe for self = No	95			
Believing flu vaccination is safe for self = Yes	209	45.5	38.75†	(9.3–161.4)
Believing influenza vaccination protects infant = No	136	8.8		
Believing influenza vaccination protects infant = Yes	165	43.6	8†	(4.10–15.60)
Believing flu vaccination is protective for self = No	121	5.8		
Believing flu vaccination is protective for self = Yes	240	37.5	9.77†	(4.36–21.89)
Antenatal care provider recommended vaccination = No	253	5.1		
Antenatal care provider recommended vaccination = Yes	144	63.2	31.69†	(16.5–60.88)
Vaccine offered at antenatal clinic = No	290	12.8		
Vaccine offered at antenatal clinic = Yes	101	64.4	12.34†	(7.24–21.05)
Knowledge of free flu vaccine = No	126	7.1		
Knowledge of free flu vaccine = Yes	242	38.0	7.97†	(3.86–16.48)
Chronic condition = No	350	22.9		
Chronic condition = Yes	57	42.1	2.46*	(1.37–4.39)
Saw promotional material at clinic = No	123	17.1		
Saw promotional material at clinic = Yes	245	29.8	2.06	(1.20–3.55)

* Statistically significant, $p < 0.05$; † Statistically significant, $p < 0.01$; Answer = unsure or missing data is excluded

Table 2. Multivariate logistic regression results for control variables, with the likelihood of having the influenza vaccination as the dependent variable

Variable	OR	CI 95%	p value
Believing influenza vaccination is safe for unborn	21.612	2.852–163.781	0.003
Antenatal care provider recommended vaccination	15.580	6.055–40.094	<0.001
Majority of care at GP	4.854	1.665–14.149	0.004
Believing vaccine protects infant	3.803	1.164–12.427	0.027
Majority of antenatal care at obstetrician	3.643	1.316–10.080	0.013
Chronic condition	3.485	1.235–9.832	0.018
Vaccine offered at antenatal clinic	2.726	1.074–6.920	0.035
Knowledge of free influenza vaccine	1.773	0.622–5.049	0.284
Metro residence	1.765	0.711–4.378	0.221
Believing influenza vaccination is safe for self	1.478	0.189–11.538	0.710
Saw promotional material at clinic	1.399	0.551–3.552	0.480
Believing vaccine is effective	1.183	0.297–4.722	0.812
Antenatal care provider other than public hospital, GP or obstetrician	1.160	0.056–23.922	0.924
Age group (years) 18–29	0.892	0.407–1.956	0.776

pamphlet about influenza in the antenatal clinic;²² as well as routinely recommending and offering influenza vaccine on-site in the clinic.²³

Provider recommendations appear to be critically important. In Rhode Island, US, influenza vaccination coverage among pregnant women increased from 22% in 2004 to 74% in 2010; parallel to the increase in the proportion of women advised to have vaccination by their antenatal care provider (33% in 2004 vs 92% in 2010).^{10,24}

In WA currently, it seems that recommending influenza vaccination is not routine: only 38% of women recalled being advised by their antenatal care provider to get vaccinated against influenza and only a quarter were offered the vaccine on-site at the antenatal clinic. Although disappointing, these results are consistent with low rates of antenatal care provider recommendations reported from elsewhere in Australia.¹⁶

Despite overall low coverage rates, GPs are leading the way in antenatal influenza vaccination in WA, with women who received the majority of antenatal care at a GP being almost five times more likely be vaccinated than those attending other antenatal care settings. Similarly, 83% of Sydney (New South Wales) women vaccinated for influenza in 2012 reported receiving their vaccination from a GP.¹⁶ More than 70% of the unvaccinated women in this and the Sydney survey (74% and 78%, respectively) said they

would have the vaccine if this was recommended by their antenatal care provider.¹⁶

This suggests significant potential to improve influenza vaccination coverage among pregnant women in Australia by ensuring all pregnant women are recommended to be vaccinated, and by offering on-site influenza vaccinations as part of routine antenatal care.

Implications for general practice

Vaccinating pregnant women against influenza is now standard of care in Australia. Recommending and offering seasonal influenza vaccination should become a routine part of antenatal care; when it does, the data from WA suggest we can potentially achieve influenza vaccination coverage rates of more than 70%.

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